

### SUPPORT FOR THE AMENDMENTS

This Amendment amends the specification; cancels Claims 3-4 and 6; amends Claims 1-2, 5 and 7-8; and adds new Claims 9-15. Support for the amendments is found in the specification and claims as originally filed. In particular, support for Claims 1 and 14 is found in canceled Claims 3-4 and in the specification at least at page 8, line 25 to page 9, line 8. Support for new Claims 9-10 and 12 is found in the specification at least at page 10, lines 2-8 ("Brookite"). Support for new Claim 11 is found in Claim 5 and in the specification at least at Table 3, Sample No. 54 ("3.45" mass% Al). Support for new Claim 15 is found in Claim 1 and in the specification at least at page 8, line 25 to page 9, line 8. No new matter would be introduced by entry of these amendments.

Upon entry of these amendments, Claims 1-2, 5, and 7-15 will be pending in this application. Claim 1 is independent.

### REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and reexamination and reconsideration of the application, as amended, in light of the remarks that follow.

Applicants thank the Examiner for the courtesies extended to their representative during the personal interview on November 14, 2007.

As discussed at the personal interview, the present invention provides a titanium alloy material with improved hydrogen adsorption resistance that can be used without risk of hydrogen embrittlement fracture in environments where hydrogen can be easily absorbed. Specification at title; page 1, lines 5-10; page 4, lines 6-10. The titanium alloy material comprises a Ti-Al alloy, and an oxide film on the Ti-Al alloy. A synergistic effect is obtained between the blocking of hydrogen diffusion by the oxide film and suppression of

hydrogen diffusion by the parent alloy so that a highly enhanced hydrogen absorption resistance is obtained. Specification at page 8, lines 13-16.

Claims 1 and 8 are rejected under 35 U.S.C. § 102(b) over EP 1 126 139 A2 ("Miyamoto").

Claim 2 is rejected under 35 U.S.C. § 102(b) over Miyamoto. In the alternative, Claim 2 is rejected under 35 U.S.C. § 103(a) over Miyamoto in view of JP 04143235A ("JP-235").

Claim 3 is rejected under 35 U.S.C. § 103(a) over Miyamoto in view of *Corrosion Science* 1999, 2031-2051 ("Yen").

Claim 4 is rejected under 35 U.S.C. § 103(a) over Miyamoto in view of Yen and further in view of JP 61276996A ("JP-996").

Claim 6 is rejected under 35 U.S.C. § 103(a) over Miyamoto in view of U.S. Patent No. 4,465,524 ("Dearnaley").

Claims 5 and 7 are rejected under 35 U.S.C. § 103(a) over Miyamoto in view of Yen and further in view of JP-996 and Dearnaley.

Claim 3 features an oxide film, and is incorporated into independent Claim 1. The Office Action at section 11, lines 6-7, admits that "Miyamoto ... fails to teach an oxide layer". The Office Action at section 11 relies upon Yen for disclosing an oxide layer.

Yen discloses that a thermally grown oxide film on commercial pure titanium retards hydrogen embrittlement. Yen at Title. Yen discloses that commercial pure titanium contains 0.16 wt% N, 0.015 wt% C, 0.0008 wt% H, 0.17 wt% O, 0.18 wt% Fe and a balance of Ti. Yen at page 2036, Table 1.

However, Yen fails to suggest independent Claim 1 limitation that "the oxide film comprises Al".

Any *prima facie* case of obviousness based on the cited prior art is rebutted by the significant improvement in hydrogen absorption resistance that is achieved in accordance with the present invention with independent Claim 1's titanium alloy material having an Al-containing oxide film 1.0 - 100 nm thick on a Ti-Al alloy where 50 mass% or more of the oxide film is a crystalline oxide. This is demonstrated in the specification at Table 2, where Sample Nos. 30-38, each with an oxide film 1.0 - 100 nm thick and a crystallinity of 50% or more, show a significantly decreased amount of absorbed hydrogen (significantly greater hydrogen absorption resistance) relative to Sample Nos. 21-29, each with an oxide film crystallinity of less than 50%, and relative to Sample No. 39, with a film thickness greater than 100 nm.

The cited prior art is silent about hydrogen, with the exception of Yen. However, Yen's use of an oxide film thermally grown on commercial pure titanium fails to suggest the independent Claim 1 limitation that "the oxide film comprises Al". Yen and the other cited prior art fail to suggest that the significantly improved hydrogen absorption resistance that is achieved by the present invention with an Al-containing oxide film, having a crystallinity of 50% or more, on a Ti-Al alloy.

Thus, any *prima facie* case for the obviousness of independent Claim 1 based on the cited prior art is rebutted. Therefore, the prior art rejections should be withdrawn.

Claims 5 and 11 are also patentable over the cited prior art, because any *prima facie* case of obviousness based on the cited prior art is rebutted by the significant improvement in hydrogen absorption resistance that is achieved by Claim 5's Al concentration layer wherein "the Al concentration layer has an Al concentration in a range of from 0.8-25 mass%; and the Al concentration of the Al concentration layer is **0.3 mass% or more higher than** an Al concentration of the Ti-Al alloy" and by Claim 11's Al concentration layer which "has an **Al**

**concentration** in a range of from **3.45-25 mass%**". This is demonstrated in the specification at Table 3.

New Claims 9-10 and 12 are further patentably distinguishable over the cited prior art, because the cited prior art fails to suggest the limitation that "the crystalline oxide comprises Brookite".

The Office Action objects to Figure 1 as being identical to Figure 1 of Miyamoto without including the legend --Prior Art--. However, Figure 1 is not identical to Figure 1 of Miyamoto. Applicants thank the Examiner for the indication during the personal interview on November 14, 2007 that "Drawing objection will be reconsidered and withdrawn." Interview Summary dated November 14, 2007.

The Abstract is objected to. To obviate the objection, the Abstract is deleted and a new Abstract is added.

The specification is objected to. The Office Action asserts:

35 U.S.C. § 112, first paragraph, requires the specification to be written in full, clear, concise and exact terms. Office Action at page 5, lines 2-3.

On the contrary, 35 U.S.C. § 112, first paragraph, reads as follows:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, ***in such full, clear, concise, and exact terms as to enable any person skilled in the art*** to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention. 35 U.S.C. § 112, first paragraph (emphasis added).

Because the original specification enables the claims, the objection to the specification should be withdrawn.

Claims 1 and 4-6 are objected to, and Claims 1-8 are rejected under 35 U.S.C. § 112, second paragraph. To obviate the objection and rejection, the claims are amended.

Pursuant to MPEP § 821.04, after independent product Claim 1 is allowed, Applicants respectfully request examination and allowance of method Claim 15, which includes all of the limitations of product Claim 1.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

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Respectfully submitted,

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